

DEVELOPMENT AND SHELF LIFE EVALUATION OF THERAPEUTIC READY TO SERVE (RTS) BEVERAGES PREPARED FROM BLENDING OF AONLA PULP AND ALOE VERA GEL

OM SINGH^{1*}, DEEPAK CHOUDHARY¹, S. K. DWIVEDI¹, B. K. PATIDAR² AND RICHA SINGH³

¹Department of Post Harvest Management, College of Horticulture, Mandsaur - 458 001, M.P., INDIA

²Department of Plant Pathology, College of Horticulture, Mandsaur - 458 001, M.P., INDIA

³Krishi Vigyan Kendra, Amberpur, Sitapur - 261 303, U.P., INDIA

e-mail: omsingh1921@gmail.com

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***Corresponding author**

ABSTRACT

An experiment was conducted in Post Harvest Management Laboratory, College of Horticulture, Mandsaur (Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya) Madhya Pradesh during the year 2014-15 to prepare a therapeutic ready-to-serve (RTS) made from blend of aonla pulp and *Aloe vera* gel. The blended juice were prepared by using different proportions of aonla pulp and *Aloe vera* gel as 80:20(1), 75:25(2), 70:30(3), 65:35(4) and 60:40(5). Prepared therapeutic RTS beverages were filled hot in 200 ml glass bottles and crown corked followed by pasteurized at $90 \pm 2^\circ\text{C}$ for 25 minutes and air cooled. The blended therapeutic RTS were analyzed for its different physicochemical as well as sensory quality and sensory quality evaluated by adopting 9 point hedonic scale. Among different blended ratio for therapeutic RTS, sample (4) blended ratio of 65:35 with 11 per cent total soluble solids and 0.30 per cent acidity was reached with highest sensory scores for overall acceptability. The developed RTS could be recommended for the large scale production at industrial level.

INTRODUCTION

Beverages based on aonla and *Aloe vera* continues to receive a considerable amount of attention reflecting a growing awareness of the potential of these products in the market place. These beverages have high nutritional quality and increased energy value. These could be particularly useful in place where there is lack of food and improper nutrition leading to deficiencies of certain nutrients (Anand, 1970 and Singh *et al.*, 2004). The development of any process for its economical utilization would be of great benefit to the beverage industry, the development of nutritionally value added product could therapeutically help on improving the health of consumers. Introduction of new types of value added beverages might improve socio-economic status of the country (Bakhr, 1998).

Aonla or Indian gooseberry (*Emblica officinalis* Gaertn) belongs to the family Euphorbiaceae. The fruit of this plant is round shaped with vertical stripes. It is greenish yellow in color and tastes sour. The fruit is fibrous in nature. The fruit possesses the highest level of heat and storage stable vitamin C known to man (Damame *et al.*, 2002). Pectin and minerals like iron, calcium and phosphorus are also found abundantly in the fruit. It is a very powerful anti-inflammatory herb (Dachiya and Dhawan, 2001). Aonla fruit is the richest source of natural vitamin C. It provides up to 900 mg/100g of juice of the fresh fruit. It has the same amount of ascorbic acid or vitamin C present in two oranges. Due to high Vitamin C content Aonla has anti-oxidative properties. Aonla also has carminative

properties. It helps in maintaining a healthy digestive system (Anand, 1970).

Aloe vera (*Aloe barbadensis* Miller) commonly known as *Ghritkumari* belongs to the family Liliaceae. It is a perennial, drought resisting succulent plant. Fresh *Aloe vera* leaves used to obtain two components, firstly "bitter yellow latex" from peripheral bundle sheath of *Aloe*, called *Aloe vera* sap and a mucilaginous gel from parenchymatous tissue called *Aloe vera* gel. *Aloe vera* leaf contains 95 per cent of water, 75 types of nutrients, 200 active compounds, 20 minerals like calcium, copper, selenium, magnesium, manganese, potassium, sodium, zinc, 18 amino acids, 12 vitamins and 92 enzymes. It can be used as the source of vitamins like A (Retinol), B₁ (Thiamin), B₂ (Riboflavine), B₃ (Niacin), B₆ (Pyridoxine), B₁₂ (Cobalamin), C (Ascorbic acid), E (Tocopherol) and Folic acid. *Aloe vera* leaf exudate contains anthraquinones, particularly barbaloin (aloin), a glucoside ofloe-emodin, which appear to be responsible for its bitter taste and cathartic effect. (Dangne *et al.*, 2000; Boudreau and Beland, 2006). Barbaloin and other products of the phenylpropanoid pathway are commonly referred to as polyphenolic compounds. These are derived from the precursor phenolic acids and may act as antioxidants to inhibit free radical-mediated cytotoxicity and lipid peroxidation (Cook and Samman, 1996). *Aloe vera* has anti-inflammatory, antioxidant, antimicrobial, anticancer, antidiabetic, immune boosting and hypoglycaemic properties and also is effective against various disorder and diseases like stroke, heart attacks, leukaemia, anaemia, hypertension, AIDS,

radiation burns, digestive disorders (Banjare *et al.*, 2014). In the food industry, it is used as an ingredient for functional food and therapeutic purposes, mainly in the development of health drinks. Today, the *Aloe vera* industry is flourishing and the gel is being used for preparation of different products, such as fresh gel, juice, squash, dry leaf powder, jam, jellies, candies, bar, munch, chewing gum, ready to serve health drinks, curd, *lassi* and ice-cream.

Aonla and *Aloe vera* are the cheapest sources from every rural area in India and they are presently underutilized fruits, but have enormous potential in the world market. Many attempts have been reported on utilization of in different combinations with other fruits and made out various types of beverages and its products. The primary consideration for evolving blending ratio has to be based on retention of attractive colour, good flavour, nutritional, medicinal and other quality both visual and organoleptic. Blended drinks are good alternative for development of new products to provide benefit of taste, nutrition as well as medicinal properties. However, the aonla is a rich source of ascorbic acid and appreciable source of total sugar, calcium, iron and phosphorus (Dachiya and Dhawan, 2001). *Aloe vera* gel contains vitamins, minerals, saccharides, amino acid, anthraquinones, lignin, saponins and salicylic acid (Pugh *et al.*, 2001). Hence, present work was carried to optimize level of aonla pulp and *Aloe vera* gel in development of blended therapeutic RTS with desirable characteristics.

MATERIALS AND METHODS

Raw material and sample preparation

Aonla and aloe vera are rich in phytochemicals and abundantly available in the Malwa region of Madhya Pradesh. Aonla fruits used for experiment were harvested at maturity in the month of November and the mature *Aloe vera* leaves were taken in the same month from the research farm of College of Horticulture, Mandsaur. The pulp of aonla and gel of *Aloe vera* are preserved with 700 ppm potassium metabisulphite and kept till the preparation of final product.

Biochemical analysis

TSS was determined by *ERMA* Hand Refractometer at 20°C and expressed in per cent. The acidity and ascorbic acid was determined by the procedure given by Ranganna (1986).

Sensory evaluation

The sensory parameters of colour and appearances, aroma, taste and overall acceptability were evaluated with 10 trained panelist based on 9 point Hedonic rating scale as described by (Amerine *et al.*, 1965).

Statistical analysis

To test the significance of variation in the data obtained, the analysis of variance technique was adopted as suggested by Panse and Sukhatme (1985). The critical difference was calculated to assess the significance of difference between treatments, whenever the results were found significant through 'F' test, C.D. at 1 % level of significance was determined.

Evaluation of blending ratio for preparation of beverages

The following blending ratios were tested for preparation of

ready to serve beverages and evaluated for organoleptic quality. 80% aonla pulp + 20 % *Aloe vera* gel of 10% juice adjusted to 12 % TSS and 0.30 % acidity.

75% aonla pulp + 25 % *Aloe vera* gel of 10% juice adjusted to 12 % TSS and 0.30 % acidity.

70% aonla pulp + 30 % *Aloe vera* gel of 10% juice adjusted to 12 % TSS and 0.30 % acidity.

65% aonla pulp + 35 % *Aloe vera* gel of 10% juice adjusted to 12 % TSS and 0.30 % acidity.

60% aonla pulp + 40 % *Aloe vera* gel of 10% juice adjusted to 12 % TSS and 0.30 % acidity.

Evaluation of recipes for preparation of ready to serve beverages

Highest scoring blending ratio of 65 % aonla pulp + 35 % *Aloe vera* gel was selected for preparation of ready to serve beverages and evaluated their organoleptic quality after preparation in following recipes.

10% blended pulp adjusted to 10% TSS and 0.20 % acidity.

10% blended pulp adjusted to 10% TSS and 0.30 % acidity.

10% blended pulp adjusted to 10% TSS and 0.40 % acidity.

10% blended pulp adjusted to 11% TSS and 0.20 % acidity.

10% blended pulp adjusted to 11% TSS and 0.30 % acidity.

10% blended pulp adjusted to 11% TSS and 0.40 % acidity.

10% blended pulp adjusted to 12% TSS and 0.20 % acidity.

10% blended pulp adjusted to 12% TSS and 0.30 % acidity.

10% blended pulp adjusted to 12% TSS and 0.40 % acidity.

Preparation of RTS

Two liter of each RTS was prepared by mixing calculated amount of blended aonla pulp and *Aloe vera* gel, sugar, citric acid and water according to blending ratio and recipes. At first both the pulp and gel are blended according to the given blending ratio and recipes. The total soluble solid in the blended juices were determined by hand refractometer and reading was corrected to 20°C and the mean value was expressed in per cent and acidity were determined by titrated against N/10 NaOH with phenolphthalein as indicator, the remaining amount of sugar and citric acid were adjusted for the preparation of ready to serve beverages. Sugar syrup was prepared by heating the mixture of sugar, water and citric acid and then it was strained through muslin cloth. Finally blended juice was mixed with syrup. Prepared RTS beverages were filled hot in 200 ml glass bottles and crown corked followed by pasteurized at 90 ± 2°C for 25 minutes and air cooled. The ready to serve thus prepared were presented for organoleptic evaluation so as to find out an ideal recipe.

RESULTS AND DISCUSSION

Result of present studies showed the possibility of obtaining an acceptable beverage with possessed attractive colour, prominent taste with good flavour and consistency by blending of aonla pulp with *Aloe vera* gel in different ratios. Blends containing 65 per cent aonla pulp + 35 per cent of *Aloe vera* gel, 12 per cent total soluble solids and 0.30 per cent of acidity was found better.

Table 1: Organoleptic quality of different blending ratio of aonla pulp and Aloe vera gel blended ready to serve

S.No	Blending ratio (Aonla pulp: Aloe vera gel)%	Juice (%)	T.S.S. (%)	Acidity (%)	Organoleptic quality Score	Rating
1	80:20	10	12	0.30	6.50	LS
2	75:25	10	12	0.30	6.80	LS
3	70:30	10	12	0.30	7.30	LM
4	65:35	10	12	0.30	8.00	LVM
5	60:40	10	12	0.30	7.50	LM
S Em ±					0.12	
CD at 1%					0.52	
CV (%)					7.03	

Table 2: Organoleptic quality of different recipe of ready to serve prepared from blended pulp of 65 per cent aonla pulp and 35 per cent Aloe vera gel

S. No.	Pulp (%)	T.S.S. (%)	Acidity (%)	Organoleptic quality Score	Rating
1	10	10	0.20	7.50	LM
2	10	10	0.30	7.10	LM
3	10	10	0.40	5.10	NLND
4	10	11	0.20	7.30	LM
5	10	11	0.30	8.50	LVM
6	10	11	0.40	5.50	NLND
7	10	12	0.20	8.10	LVM
8	10	12	0.30	7.20	LM
9	10	12	0.40	5.80	NLND
S Em ±				0.16	
CD at 1%				0.67	
CV (%)				7.12	

Evaluation of blending ratio for quality ready to serve beverages

Data on organoleptic evaluation of blended RTS in different blending ratio are given in Table 1. Result revealed that blending ratio of 65 per cent aonla pulp + 35 per cent *Aloe vera* gel was found superior followed by the ratio of 60 per cent aonla pulp + 40 per cent *Aloe vera* gel and RTS prepared from 70 per cent aonla pulp + 30 per cent *Aloe vera* gel. There was non-significant difference in the organoleptic score of ratio (65:35) and (60:40).

Blending of juice is one of the best methods to improve the nutritional, medicinal and acceptability of the ready to serve beverages. The similar improvement in visual and organoleptic quality of blended beverage has been reported by several workers i.e. blended RTS of 60 % aonla pulp + 40 % bael pulp (Rathod *et al.*, 2014), blended RTS of 75 % bael pulp + 25 % *Aloe vera* gel (Tiwari and Deen, 2015), blended RTS of 90 % *Aloe vera* gel + 10 % aonla pulp (Kumar, 2013) which is close to present finding. Blended RTS of 90 % papaya juice + 10 % *Aloe vera* juice (Boghani *et al.*, 2012), blended RTS of 75 % *Aloe vera* gel + 15 % aonla pulp + 15 % ginger juice (Kumar *et al.*, 2013) blended RTS of 80 % *Aloe vera* gel + 10 % mint extract + 10 % ginger extract (Yadav *et al.*, 2013), blended RTS of 25 % aonla pulp + 75 % mango pulp (Singh *et al.* 2014), orange, pomegranate & ginger (86:10:4) obtained maximum sensory scores viz., colour, flavor, taste and overall acceptability (Gupta *et al.*, 2015).

Evaluation of recipe for preparation of ready to serve beverages

Data on organoleptic quality of various recipes for preparation of ready to serve are depicted in Table 2. Results indicated that the RTS having 10 per cent pulp 11 per cent total soluble solids and 0.3 per cent acidity was significantly superior to all recipes except 10 % pulp, 12 % TSS and 0.20 % acidity. However the non significant difference in the organoleptic scores of recipe 5 and 7.

Similar work have been done and reported by Boghani *et al.* (2012) who formulated a recipe of blended ready to serve beverages from papaya and *Aloe vera* juice, containing 12% total soluble solids, 0.3% acidity and 10% blended juice. Similarly Jakhar *et al.* (2012) prepared blended ready to serve beverage from guava and barbados cherry with 10 per cent blended pulp, 12 per cent TSS and 0.2 per cent acidity, which is very close to present finding. Kumar *et al.* (2013) advocated a recipe of *Aloe vera*, aonla and ginger blended ready to serve with the recipe of 15% blended juice, 15% of total soluble solid and 0.3% of acidity. Deen and Kumar (2014) prepared mango and ginger blended beverage with 12 % blended juice, 13 % total soluble solids and 0.25 % acidity. Thus it would be important to mention here that a blended ratio of aonla pulp and *Aloe vera* gel along with a standardized recipe is required to produce desirable nutritional and medicinal quality in beverages.

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